THE INVESTIGATION OF THE "FREE RIFLE 60 SHOTS" EVENT

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INTRODUCTION

The sport of shooting has not been widely investigated. During the investigation of this kind of sport the most important point is comparing and measuring of the individual characteristic features of the individual and measuring the individual's performance development. Shooting is an individual sport which means that most of the shooters would like to keep in secret advantages and the key points of their technique. The theory behind this paper was based on L. Hammerl (Olympic winner in 1964 Tokyo - free rifle 60 shoots with 597 score).

METHODOLOGY

We have recently collected data so we have not had time to prepare data profiles on multiple subjects. In the future we will utilize more shooters from representative teams and the clubs. We will investigate their current technique and their technique development.

We have had many problems with the program. Thus we must repair and modify the system during data collection. The system consist of four main parts: 1) the personal computer, 2) the external electronic circuit, 3) the measuring and 4) evaluation software. A schematic of the system is presented in Figure 1.
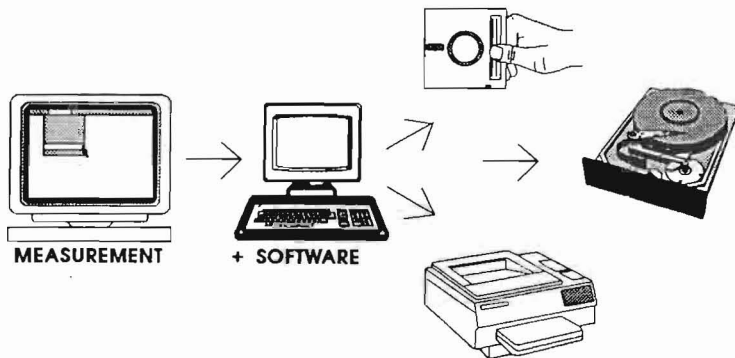

MEASUREMENT   + SOFTWARE

Figure 1. The elements of the system.

The shooter gives a sign to start and stop the different phases of aiming and shooting using the electronic circuit. This circuit is connected to the standard parallel printer port of the computer. On screen we can see the simulated picture of the target, the environment (the shooting field), the bull's eye and the full bead. The shooter can control the start and the end of the movement but cannot control the process. The examiner, the shooter or the computer can set most of the parameters of the algorithm but only before the competition. We can control the total test with the changing of these algorithms.

You can see in Figure 1 the measured and evaluated data are in multiple formats (ASCII, graphics on screen, printers or disk). Thus, the user can treat the data with other programs.

From our experience using this system, we have high-lighted several problems:
* How do we correct for mistakes in the uniform values of measured times during one or more "competitions" - with the same difficulty algorithm?
* How do we compare the results of the different competitions if the algorithms are the same (see Figure 2)? How do we allow for development?
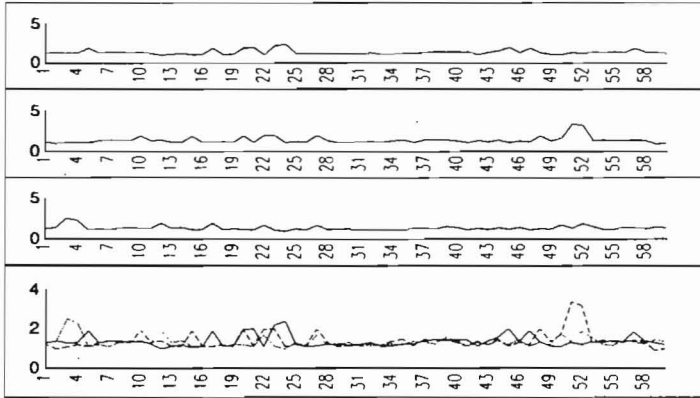* How do we compare the results during sequences of data collections with different algorithms?

Figure 2. The graphics results of more "training."

In Figure 2, the measured times between the correct position of the aim and the moment of the shot are presented. This figure presents the values of one measured variable during several competitions. We can also measure this variable for a single competition.

In Figure 3 the variables describing the previous "reaction" time, the full time of shot, the interval of correct position of the aiming system and the scores of the simulated shots are presented. The data from a single competition are presented here. The future aim is to investigate these peak and valley of these tracings. These figures were made during the test of the system with the senior competitors and coaches.
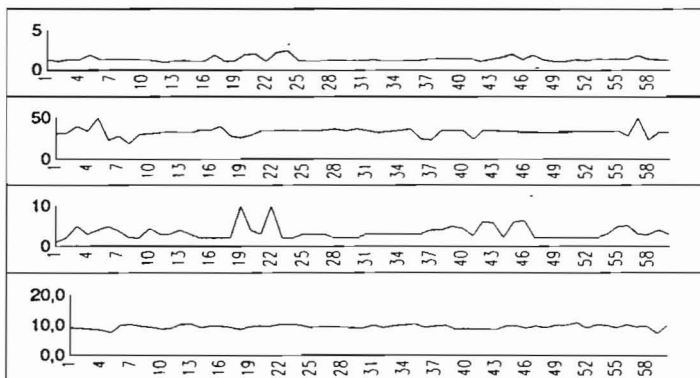

Figure 3. The results of one "training."

RESULTS AND DISCUSSION

We have very limited practice using this system but we have already experienced one very important thing. The shooters and trainers saw that the data collections are serious and more than a simple game. We cannot compare our data with the others because the known methods and protocols are different - for example the NOPTEL system or the protocols of Zatsiorsky and Aktov (1990). We hope that this new system provides a usable method for studying shooting. We hope that, after verifying our methods and hypotheses, we can help the shooters and coaches to find their mistakes and improve their scores and techniques.

REFERENCES

Zatsiorsky, V. M. and Aktov, A. V. (1990). Biomechanics of highly precise movements: the aiming process in air rifle shooting. J Biomech 23:35-41.